

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-21 are pending in this application, Claim 21 having been added, and Claims 5-16 and 18-20 having previously been withdrawn. Support for added Claim 21 can be found, for example, in the original claims, drawings, and specification as originally filed.¹ No new matter is added.

In the outstanding Official Action, Claim 1 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sportouch et al. (Thermoelectric Properties of Half-Heusler Phases: $\text{ErNi}_{1-x}\text{Cu}_x\text{Sb}$, $\text{YNi}_{1-x}\text{Cu}_x\text{Sb}$ and $\text{Zr}_x\text{Hf}_y\text{Ti}_z\text{NiSn}$, 18th International Conference on Thermoelectrics, 1999, pgs 344-347; hereinafter “Sportouch”) in view of Shen et al. (Synthesis and Sintering of ZrNiSn Thermoelectric Compounds, 21st International Conference on Thermoelectrics, August 25-29, 2002, pgs 166-169, hereinafter “Shen”); Claims 2-4 were rejected under 35 U.S.C. § 103(a) as unpatentable over Sportouch in view of Shen, further in view of Hohl et al. (Efficient dopants for ZrNiSn based thermoelectric materials, J. Phys.: Condens. Matter, 11, 1999, pgs 1697-1709; hereinafter “Hohl”); and Claim 17 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sportouch in view of Shen, further in view of Bell (U.S. Patent No. 6,700,052).

In response the rejection of Claim 1 under 35 U.S.C. § 103(a) as unpatentable over Sportouch in view of Shen, Applicants respectfully request reconsideration of the rejection and traverse the rejection as discussed next.

Independent Claim 1 is directed to a:

...thermoelectric material which is a sintered body and represented by composition formula (1) and comprises as a major phase an MgAgAs crystal structure, the sintered body being obtained by manufacturing an alloy containing

¹ See page 36 of the specification.

predetermined elements, pulverizing the alloy to obtain an alloy powder, and monolithic molding the alloy powder by sintering, hot press or SPS method, wherein the composition formula (1) is $(\text{Ti}_{a1}\text{Zr}_{b1}\text{Hf}_{c1})_x\text{Ni}_y\text{Sn}_{100-x-y}$, and

a_1, b_1, c_1, x and y satisfy the conditions of: $0 < a_1 < 1$,
 $0 < b_1 < 1$, $0 < c_1 < 1$, $a_1+b_1+c_1=1$, $30 \leq x \leq 35$ and
 $30 \leq y \leq 35$,

and the sintered body has a dimensionless figure-of-merit ZT value of not less than 0.05 at 300° K.

Page 6 of the August 28, 2007 Office Action acknowledged that Sportouch does not teach or suggest a sintered body. In an attempt to cure this deficiency of Sportouch, that Office Action cites Shen. However, Applicant respectfully submits that that the rejection based on Shen has been overcome by the enclosed declaration under 37 C.F.R §1.132, as Shen fails to teach or suggest that “the sintered body has a dimensionless figure-of-merit ZT value of not less than 0.05 at 300° K,” as recited in Applicants’ independent Claim 1.

Page 3 of the outstanding Office Action states that “since the Shen reference teaches the same technique used to form thermoelectric compounds, the properties of the formed product would inherently have the same dimensions as claimed, absent some showing of comparative results.” Applicants respectfully disagree and enclose the attached Declaration under 37 C.F.R. § 1.132, which explains that the dimensionless figure-of-merit ZT value at 300° K of Shen is 0.04, which is less than 0.05. The Declaration states that fine grain sized Ti powder, Zr powder, Hf powder, Ni powder, and Sn powder are prepared as raw materials, and when using these raw material metallic powders, a sintered body having the same composition as shown in Example I-9 of the present invention is obtained by the method of Shen. Using this composition, the dimensionless figure of merit ZT of the obtained sintered body at a temperature of 300° K is then calculated in the same manner as described in the Applicants’ embodiments, and the measured dimensionless figure of merit ZT value is 0.04.

However, as seen in Applicants' Table 1 on page 36 of the specification, the dimensionless figure of merit ZT value of the sintered body shown in Example I-9 of the Applicants' invention is 0.08. Thus, the dimensionless figure of merit ZT value of the sintered body obtained by the method of Shen is only half of that of the sintered body of an embodiment of Applicants' invention as shown in Example I-9. As a result, the sintered body obtained by the method of Shen is inferior to that of the present invention in thermoelectric characteristics, even if the composition of the sintered body of Shen has the same composition as the Applicants' sintered body.

Thus, Applicants respectfully submit that Shen fails to teach or suggest that the sintered body has a dimensionless figure-of-merit ZT value of not less than 0.05 at 300° K, as recited in Claim 1, and respectfully request the rejection of Claim 1 under 35 U.S.C. § 103 be withdrawn.

In response to the rejection of Claims 2-4 were rejected under 35 U.S.C. § 103(a) as unpatentable over Sportouch further in view of Hohl, Applicants note that Claims 2-4 are dependent on independent Claim 1 and are believed to be patentable for at least the reasons discussed above. Further, Applicants respectfully submit that Hohl fails to cure any of the above-noted deficiencies of Shen and Sportouch.

Accordingly, Applicants respectfully request the rejection of Claims 2-4 under 35 U.S.C. § 103(a) as unpatentable over Sportouch further in view of Hohl be withdrawn.

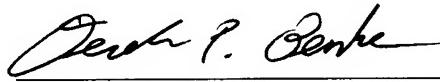
In response to the rejection of Claim 17 under 35 U.S.C. § 103(a) as unpatentable over Sportouch further in view of Bell, Applicants note that Claim 17 is dependent on Claim 1 and is thus believed to be patentable for at least the reasons discussed above. Further, Applicants respectfully submit that Bell fails to cure any of the above-noted deficiencies of Shen and Sportouch.

Accordingly, Applicants respectfully request the rejection of Claim 17 under 35 U.S.C. § 103(a) as unpatentable over Sportouch in view Shen and further in view of Bell be withdrawn.

Consequently, in view of the present amendment, and in light of the above discussion, the pending claims as presented herewith are believed to be in condition for formal allowance, and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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